AN 105:119315 HCA
TI Fatigue-resistant **nickel**-base superalloys
IN Chang, Keh Minn
PA General Electric Co., USA
SO Eur. Pat. Appl., 33 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 184136	A2	19860611	EP 1985-115068	19851127
	EP 184136	A3	19880107		
	EP 184136	B1	19910925		
	R: DE, FR, GB, IT, SE				
	US 4685977	A	19870811	US 1984-677449	19841203
	IL 76946	A1	19881230	IL 1985-76946	19851105
	JP 61147839	A2	19860705	JP 1985-270861	19851203
	CA 1253363	A1	19890502	CA 1986-502406	19860221
PRAI	US 1984-677449		19841203		

AB Prepn. of forgeable turbine **Ni** superalloys contg. Cr 14-18, Co 10-14, Mo 3-5, W 3-5, Al 2-3, Ti 2-3, Nb 2-3, Ta 0-3, Zr 0.02-0.08, and B 0.01-0.05% and having a grain size of 3-5 ASTM consists of melting, casting into a cylindrical Cu **mold**, homogenizing at 1200.degree. for 24 h, 2-step forging, annealing 5-15.degree. above the recrystn. temp., **cooling** at 80-150.degree./min, and **aging** 8-24 h at 600-800.degree.. The 2-step forging includes conversion of ingot to a billet and final forging at a starting temp. of 5-25.degree. above and carrying on temp. below the .**gamma**.' solvus temp. The alloys have higher fatigue cracking resistance and strength and comparable creep properties to those of powd. metallurgy alloys. Thus, the **Ni** alloy contg. C 7.0, Cr 11.0, W 3.2, Al 2.8, Ti 2.1, Nb 2.4, Zr 0.05, B 0.01, and C 0.01% exhibited only minor cracks during forging at 2050.degree.. The yield strength, tensile strength, and elongation at room temp. were 147 ksi, 210 ksi, and 27%, resp. The corresponding values at 1200.degree. were 142, 1918, and 20.

AN 116:134535 HCA
TI Thermomechanical processing for fatigue resistance of sintered nickel superalloys
IN Chang, Keh Minn
PA General Electric Co., USA
SO U.S., 15 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 5061324	A	19911029	US 1990-503007	19900402

AB The Ni superalloys having .gtoreq.35 vol.% .gamma.'-phase are isothermally forged for .gtoreq.20% deformation below the solvus temp., annealed at a higher temp. to dissolve the pptd. .gamma.'-phase, slowly cooled for an equiaxed microstructure with 50-60 .mu.m grain size, and optionally **aged** for 8-64 h at 650-850.degree.. The resulting parts from sintered Ni superalloys of Astroloy and related types show increased resistance to fatigue crack growth, esp. in high-temp. cyclic loading with a holding at the max. stress. The isothermal forging is controlled at 5-125.degree. below the solvus temp. and the strain rate of nominally 0.001-0.1/min (decreasing with the lower forging temp.) to maintain the microstructure with grain size of .ltoreq.10 .mu.m, prior to the grain growth to 50-60 .mu.m in the annealing stage at 5-35.degree. above the solvus temp.

AN 111:43847 HCA
TI Heat treatment for improving fatigue properties of superalloy articles
IN Blackburn, Martin J.; Paulonis, Daniel F.; D'Orvilliers, Anne L.; D. Orvilliers, Anne L.
PA United Technologies Corp., USA
SO U.S., 11 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4820356	A	19890411	US 1987-137853	19871224
	GB 2214192	A1	19890831	GB 1988-28035	19881201
	GB 2214192	B2	19910918		
	DE 3842748	A1	19890713	DE 1988-3842748	19881219
	DE 3842748	C2	19960919		
	FR 2625753	A1	19890713	FR 1988-17010	19881222
	FR 2625753	B1	19931112		
	JP 01205059	A2	19890817	JP 1988-327520	19881224
	JP 2974684	B2	19991110		
PRAI	US 1987-137853		19871224		

AB Superalloy forgings are heat-treated for a fine-grained microstructure to increase the resistance to fatigue crack initiation and growth. The heat treatment is being done in 3 stages at temp. level below the .gamma.'-phase solvus temp. with a reheating in 2nd stage in relation with forged article size. Thus, MERL 76 superalloy forgings were heat-treated 2 h at 2140 .degree.F (solvus 2175 .degree.F) to intergranularly ppt. coarse .gamma.'-phase, cooled with an air jet at .apprx.100 .degree.F/h to 1800 .degree.F and then naturally cooled to room temp., heat-treated 2 h at 2075 .degree.F to transgranularly ppt. fine-grained .gamma.'-phase, forcedly cooled to room temp., and then **aged** 16 h at 1350 .degree.F to obtain a product.

AN 121:185168 HCA
TI Heat treatment of nickel superalloy for promoting crack growth resistance
IN Tillman, Thomas D.; Robertson, John M.; Cox, Arthur R.
PA United Technologies Corporation, USA
SO U.S., 8 pp. Cont.-in-part of U.S. Ser. No. 434,654, abandoned.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5328659	A	19940712	US 1985-733446	19850510
PRAI	US 1982-434654		19821015		

AB The articles made of Ni superalloys (esp. Astroloy, IN-100, or Rene 95) are heat treated using the true soln. stage followed by **aging** stages, to decrease the crack growth rate. The multiple-stage heat treatment promotes the superalloy microstructure having an optimum size and arrangement of .gamma.'-phase particles, esp. for decreased crack growth rate in turbine disks. The process is suitable for the Ni superalloys contg. Cr 12-15.5, Co 8-19, Ti 2-4.5, Al 3.2-5.2, Mo 2.8-5.4, C 0.01-0.1, Zr 0-0.08, B 0.005-0.024, V 0-1, Ta 0-4, Nb 0-1.5, Hf 0-0.45, and W 0-4%.

AN 127:194082 HCA
TI Hot-**die** forging of nickel superalloys with annealing for grain size control
IN Benz, Mark Gilbert; Huron,, Eric Scott; Raymond, Edward Lee; Blankenship, Charles Philip; Kissinger, Robert Donald; Henry, Michael Francis
PA General Electric Company, USA
SO Eur. Pat. Appl., 10 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 787815	A1	19970806	EP 1997-300476	19970127
	EP 787815	B1	20011004		
	R: DE, FR, GB, IT				
	JP 09302450	A2	19971125	JP 1997-20876	19970204
PRAI	US 1996-598452	A	19960207		

AB The Ni-superalloy preform having a microstructure with .gamma. and .gamma.' phases is forged in a heated **die** at the strain rate of 0.03-10/s at .gtoreq.1600.degree. F but below the .gamma.'-solvus temp., followed by isothermal final forging (esp. at 1925.degree. F), heat treatment with annealing above the solvus temp., and the final cooling. The forging process is suitable for the Ni superalloy ingots manufd. by sintering and billet extrusion. The Ni superalloys contain mainly Co 8-15, Cr 10-19.5, Mo 3-5.25, Al 1.4-5.5, and Ti 2.5-5%.

AN 1985-058137 [10] WPIDS
DNC C1985-025269
TI **Nickel base** lining alloy for injection moulding machine etc. - contains cobalt, chromium, molybdenum, boron, silicon and manganese.
DC A32 M26
PA (DAIZ) DAIDO TOKUSHUKO KK
CYC 1
PI JP 60013042 A 19850123 (198510)* 5p
JP 02056410 B 19901130 (199101)
ADT JP 60013042 A JP 1983-120942 19830705; JP 02056410 B JP 1983-120942 19830705
PRAI JP 1983-120942 19830705
AB JP 60013042 A UPAB: 19930925
Wear and corrosion resistant alloy comprises, by wt., Co max. 35%, 5-20% Cr, 1-10% Mo, 1-4% B, 1-5% Si, Mn max. 2%, optionally one or both of C max. 0.3% and Fe max. 25%, and the **balance Ni** and impurities. Al content existent as an impurity in the alloy is below 1%.

USE/ADVANTAGE - The alloy is useful as a hard layer applied onto the surface of a cylinder for an injection moulding machine, slurry pump, compressor, etc. Its hardness is enhanced by the formation of cobalt, nickel and chromium borides, and its corrosion resistance is improved by the addition of Co, Cr and Mo.

In an example, an alloy (33.3% Co, 5.0% Cr, 8.0% Mo, 4.0% B, 3.0% Si, 0.8% Mn, 0.12% C, 0.012% Al, 0.70% Fe and bal.Ni) had hardness of HRC 53.2, specific abrasion ratio of 5.1 x 10-8 mm2/kg and corrosion wt. loss of 19.2 mg in a 50%-HCl solution or 12.7 mg in a 50%-H2SO4 soln.
0/0

AN 1992-114807 [15] WPIDS
DNC C1992-053502
TI Tyre **mould** - has internal **inserts** of **nickel** (**alloys**) for compatibility with the anodising treatment.
DC A32 A95
IN KOCI, J
PA (KOCI-I) KOCI J
CYC 1
PI BR 9004061 A 19920225 (199215)*
ADT BR 9004061 A BR 1990-4061 19900816
PRAI BR 1990-4061 19900816
AB BR 9004061 A UPAB: 19931006
The tyre mould segments made of aluminium or its alloys have inserts on the internal surface for forming the tread pattern made of nickel or its alloys. This makes them compatible with the hard anodising bath and process applied normally to the external and internal mould surfaces.
0/0

AN 1995-167615 [22] WPIDS
DNC C1995-077822
TI Cylinder for plastic moulding machine etc - has lining material formed of chromium boron, carbon, silicon, manganese , iron , copper , tungsten , cobalt , molybdenum , nickel etc.
DC A32 M26
PA (HITK) HITACHI METALS LTD
CYC 1
PI JP 07090437 A 19950404 (199522)* 8p
ADT JP 07090437 A JP 1993-241259 19930928
PRAI JP 1993-241259 19930928
AB JP 07090437 A UPAB: 19950609
Lining material included in a cylinder, is formed of Cr of 5.0-20.0 wt.% B of 1.5-4.0 wt.%, C of 0.7 wt.% or less, Si of 1.0-4.0wt.%, Mn of 2.0wt.% or less, Fe of 5.0-20.0 wt.%, Cu of 5.0-20.0wt.%, W of 3.0-15.0wt.%, Co of 3.0-20.0 wt.%, Mo of 2.0-12.0wt.%, **Ni remainder** and impurities of **Ni** gp. **alloy**.

The cylinder includes a hollow cylindrical cylinder mother material made of alloy steel and an abrasion-and-corrosion resistant lining material which is provided on the inner surface of the cylinder mother material.

USE/ADVANTAGE - For plastic moulding machine etc. A cylinder having high fatigue strength and anti-cracking property, is obtained without extra cost or work.

Dwg.0/9

AN 1995-303442 [40] WPIDS
DNN N1995-230508 DNC C1995-135773
TI Refractory lining for a metal foundry **mould** - having intermediate **lining** to improve adhesion of protective lining.
DC M13 M22 P53
IN AZEMAR, P; KOPNIAEFF, J; LENOIR, E
PA (CITR) AUTOMOBILES CITROEN SA; (CITR) AUTOMOBILES PEUGEOT; (CITR) AUTOMOBILES PEUGEOT SA
CYC 5
PI EP 670190 A1 19950906 (199540)* FR 5p
R: DE ES GB IT
FR 2716898 A1 19950908 (199541) 12p
EP 670190 B1 20000503 (200026) FR
R: DE ES GB IT
DE 69516566 E 20000608 (200034)
ES 2146294 T3 20000801 (200040)
ADT EP 670190 A1 EP 1995-400426 19950228; FR 2716898 A1 FR 1994-2327 19940301; EP 670190 B1 EP 1995-400426 19950228; DE 69516566 E DE 1995-616566 19950228, EP 1995-400426 19950228; ES 2146294 T3 EP 1995-400426 19950228
FDT DE 69516566 E Based on EP 670190; ES 2146294 T3 Based on EP 670190
PRAI FR 1994-2327 19940301
AB EP 670190 A UPAB: 19951011
A metallic mould is coated with an intermediate layer made of an **alloy** of **Ni**, Cr, Al and Y followed by a protective refractory layer chosen from mullite, yttrium oxide and mixtures of MgO-Al2O3 such as spinel.
USE - As mould for casting Al-Si alloys.
ADVANTAGE - Has increased working life compared with **mould lining** made by spray gun coating.
Dwg.0/1

AN 90:42446 HCA
TI Effect of heat treatment on the morphology of the strengthening phase and properties of the alloy EP539L
AU Aleksandrova, N. P.; Kurdyumova, I. G.; Grozov, D. P.
CS USSR
SO Metalloved. Term. Obrab. Met. (1978), (11), 40-4
CODEN: MTOMAX; ISSN: 0026-0819
DT Journal
LA Russian
AB The effect of heat treatment was studied on the content, dispersity, and distribution of the basic strengthening .**gamma**.'-phase in the cast **Ni** alloy EP539L [37322-14-8]. The optimum parameters for specimens cast in hot ceramic **molds** were (1) heating at 1150.degree. for 2 h (2) air **cooling** to 850.degree. and **aging** for 16 h (3) air **cooling**. Heat treatment at optimum parameters resulted in highly ordered and uniform distribution of 1000-1400 .ANG. particles of the strengthening .**gamma**.'-phase. The following mech. properties were obtained at 900.degree.: tensile strength 56-58 kg/mm2, elongation 12-16, and area redn. 16-20%.

oil bath

AN 1989-043241 [06] WPIDS
DNC C1989-018997
TI Wear-resistant traveller for high speed spinning frame - has **nickel**-iron **alloy** undercoating and nickel-phosphorus surface layer.
DC F01 M13
PA (KANA-I) KANAI H
CYC 1
PI JP 63315621 A 19881223 (198906)* 3p
JP 04018049 B 19920326 (199217) 2p
ADT JP 63315621 A JP 1987-152054 19870618; JP 04018049 B JP 1987-152054 19870618
PRAI JP 1987-152054 19870618
AB JP 63315621 A UPAB: 19930923
The traveller has on a base material surface, (a) an undercoating layer composed of **Ni**-Fe **alloy**, and (b) a **Ni**-P **based** surface layer which is formed by plating or composite plating. The undercoating layer is pref. 0.1-5 microns thick, and the surface layer is 3-15 microns thick.

USE/ADVANTAGE - The traveller has improved wear resistance. Adhesion of the **Ni**-P **based** surface layer to the substrate is improved by the **Ni**-Fe **based** undercoating layer.

In an example, a C-figure-shaped traveller made of hard steel wire was electroplated to form about a 1 micron thick Ni layer on its surface. By heat-treating at 850 deg.C for 10 mins. in nitrogen atmos. followed by quenching in an **oil bath**, the Ni-layer was diffused into the substrate to form a Ni-Fe undercoating layer. On the traveller surface, Ni-P layer was formed by electroless plating. By heating at 400 deg.C for about 1 hr. followed by heat-treating at 400 deg.C for about 1 hr., a surface layer having a Vickers hardness of about 1000 Hv was formed.

0/4

AN 136:121858 HCA
TI Heat treatment of rigid **die** inserts made of nickel superalloy for hardening and crack prevention
IN Rowe, Raymond Grant; Mika, David Peter; Majorell, Arne Ronald
PA General Electric Company, USA
SO Eur. Pat. Appl., 9 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1176222	A2	20020130	EP 2001-305605	20010627
	EP 1176222	A3	20020306		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
PRAI	US 2000-215601P	P	20000630		
	US 2001-825128	A	20010403		

AB A rigid **die** insert used in hot forming and shaping is manufd. from a Ni superalloy (preferably **Rene 95**), and is heat treated in 2 stages to promote uniform grain size and distribution of the .gamma.' phase. The superalloy insert is heated to sub-solvus temp. of .apprx.2050.degree. F, held under inert atm. for .apprx.2 h to dissolve the larger .gamma.'-phase grains, quenched to room temp., and reheated for 16 h at .apprx.1400.degree. F under Ar for uniform growth of the .gamma.'-phase grains. The heat-treated insert has the Rockwell C-scale hardness of 48-52 with increased yield strength, and shows resistance to cracks under mech. loading.